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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/788,687	02/26/2004	Hoa Van Do	HSJ920040016US1	7009
44425	7590	01/20/2006	EXAMINER BERNATZ, KEVIN M	
THOMAS R. BERTHOLD 18938 CONGRESS JUNCTION COURT SARATOGA, CA 95070			ART UNIT 1773	PAPER NUMBER

DATE MAILED: 01/20/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/788,687	Applicant(s) DO ET AL	
	Examiner Kevin M. Bernatz	Art Unit 1773	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-15 is/are pending in the application.
 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-15 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 26 February 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>2x2/26/04</u> . | 6) <input type="checkbox"/> Other: ____. |

DETAILED ACTION

Response to Amendment

1. Preliminary amendments to claims 1 and 9 have been entered in the above-identified application.

Double Patenting

2. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

3. Claims 1 – 8 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1 - 14 of copending Application No. 10/808,020. Although the conflicting claims are not identical, they are not patentably distinct from each other because the claims of App '020 do not differentiate between a "ferromagnetic coupling layer" and an "antiferromagnetic coupling layer", in that the magnetization directions in the claims of App '020 and the pending claims are not claimed to be either in the parallel or anti-parallel. As such, the

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claims of App. '020 read on the present claims. This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

5. Claims 1 – 8 are rejected under 35 U.S.C. 112, first paragraph, as not being enabling because the claim(s) omit(s) matter disclosed to be essential to the invention as described in the specification or in other statements of record. *In re Mayhew*, 527 F.2d 1229, 188 USPQ 356 (CCPA 1976). See also MPEP § 2164.08(c).

The magnetization directions of the ferromagnetic layers are deemed critical or essential to the practice of the invention, but not included in the claim(s). Specifically, the Examiner notes that applicants rely upon the language “antiferromagnetically coupling layer” in an attempt to imply that the two ferromagnetic layers described on both sides of the “antiferromagnetic coupling layer” are necessarily antiferromagnetically coupled. However, since applicants’ claims are open to additional layers the Examiner notes that this is an impermissible reading of the specification into the claims. As such, while the non-magnetic intermediate layers may be claimed using the *nomenclature* of an “antiferromagnetic coupling layer”, such nomenclature does not add any additional structure or functional limitations to the claims.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 1 – 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Abarra et al. (U.S. Patent App. No. 2003/0124390 A1) in view of Wang et al. (U.S. Patent No. 6,794,057 B2) and in view of the evidence supplied by Do et al. (WO 03/065356 A1).

Regarding claim 1, Abarra et al. disclose a magnetic recording disk (*Paragraphs 0002 – 0004*) comprising a substrate (*Figure 2, element 1*), a first lower ferromagnetic (FM) layer (*element 7-1*) on the substrate and having a remanent magnetization M_r , a thickness t , and a remanent-magnetization-thickness product Mrt , a first antiferromagnetically coupling (AFC) layer (*element 8-1*) on the first lower FM layer, a second lower FM layer (*element 7*) on the first AFC layer, a second AFC layer (*element 8*) on the second FM layer, a third lower FM layer (*Paragraph 0043 – additional bilayers of FM/AFC disclosed*) on the second AFC layer, a third AFC layer (*ibid*) on the third lower FM layer, and an upper FM layer (*element 9*) on the third AFC layer.

Abarra et al. fail to disclose the relative Mrt requirements claimed by applicants, specifically that (1) the second lower FM layer has a lower Mrt than the first and third

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FM layers and that the upper FM layer has a Mrt greater than the sum of the first and third lower FM layers.

However, Abarra et al. does teach that layer 7 (corresponding to applicants' second lower FM layer) may possess a Mrt less than layer 7-1 (*Paragraph 0046*). The Examiner notes that one of ordinary skill in the art would appreciate that, essentially, Abarra et al. is teaching that the relative magnitude of the Mrt of the various layers is not critical to the invention. I.e. whether the second lower FM layer has a lower or higher Mrt than the first and third lower FM layers are functional equivalents. Applicants are invited to present evidence of unexpected results when using a second lower FM layer possessing a Mrt lower than the first and third lower FM layers.

However, Wang et al. teach that in antiferromagnetically coupled recording media, the main recording layer (*which the Examiner notes is element 9 in the Abarra et al. invention*) possesses a Mrt greater than the sum of the Mrt's from the stabilizing layers, which can be multiple layers, acting on the recording layer in a destructive manner (i.e. with a magnetization direction antiparallel to that of the main recording layer), hence achieving a recording medium with improved signal-to-noise characteristics (*col. 2, lines 50 – 62; col. 4, lines 7 – 18; col. 4, lines 61 – 67; and col. 5, lines 18 – 33*).

It would therefore have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the device of Abarra et al. to possess Mrt values meeting applicants' claimed limitations as taught by Abarra et al. and Wang et al.,

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thereby achieving a functionally equivalent recording medium with improved signal-to-noise characteristics.

Regarding claims 2, 4 and 5, Abarra et al. in view of Wang et al. disclose FM layers meeting applicants' claimed limitations (*Abarra et al. - Paragraphs 0037 – 0038*).

Regarding claim 3, Abarra et al. disclose that any number of multiple bi-layers of FM/AFC layers is acceptable and the Mrt limitations are deemed to be obvious for the reasons noted above.

Regarding claim 6, Abarra et al. teach AFC layers meeting applicants' claimed limitations (*Paragraph 0037*).

Regarding claims 7 and 8, Abarra et al. teach underlayers (*elements 2- 6*) and protective layers (*elements 10 and 11*) meeting applicants' claimed structural limits.

Regarding claims 9 – 15, Abarra et al. teach that the magnetization directions of the various layers are all anti-parallel from each other (*Paragraphs 0016 and 0027 – 0043*). While Abarra et al. is silent about there being two remanent states meeting applicants' claimed limitations, the Examiner notes that this is necessarily present in an antiferromagnetically coupled recording medium, since that is how the magnetization directions respond in the absence of an applied magnetic field. This is taught in Do et al. (*page 17 and Figure 7*).

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8. Claims 1 – 3, 6 – 10 and 13 – 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bertero et al. (U.S. Patent App. No. 2005/0008902 A1) in view of the evidence supplied by Do et al. ('356 A1).

Regarding claim 1, Bertero et al. disclose a magnetic recording disk (*Abstract*) comprising a substrate (*Figure 3c, element 310*), a first lower ferromagnetic (FM) layer (*element 331₁*) on the substrate and having a remanent magnetization M_r , a thickness t , and a remanent-magnetization-thickness product Mrt , a first antiferromagnetically coupling (AFC) layer (*element 321₂*) on the first lower FM layer, a second lower FM layer (*element 331₂*) on the first AFC layer, a second AFC layer (*element 321₃*) on the second FM layer, a third lower FM layer (*element 331₃*) on the second AFC layer, a third AFC layer (*element 321₄*) on the third lower FM layer, and an upper FM layer (*element 331₄*) on the third AFC layer.

Bertero et al. fail to disclose the relative Mrt requirements claimed by applicants, specifically that (1) the second lower FM layer has a lower Mrt than the first and third FM layers and that the upper FM layer has a Mrt greater than the sum of the first and third lower FM layers.

However, Bertero et al. teach that the relative magnitude of the Mrt values can essentially vary in any manner without substantially effecting the function of the disclosed invention (*Paragraphs 0031 – 0034*). As such, the Examiner deems that the claimed Mrt limitations are merely functional equivalents since there is presently no evidence of record that the claimed Mrt values produce an unobvious difference between structures possessing Mrt values that are identical (for example).

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It would therefore have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the device of Bertero et al. to possess Mrt values meeting applicants' claimed limitations as taught by Bertero et al., since substitution of equivalents requires no express motivation as long as the prior art recognizes the equivalency. *In re Fount* 213 USPQ 532 (CCPA 1982); *In re Siebentritt* 152 USPQ 618 (CCPA 1967); *Graver Tank & Mfg. Co. Inc. v. Linde Air Products Co.* 85 USPQ 328 (USSC 1950).

Regarding claim 2, Bertero et al. disclose FM layers meeting applicants' claimed limitations (*Paragraph 0028*).

Regarding claim 3, Bertero et al. disclose that any number of multiple bi-layers of FM/AFC layers is acceptable and the Mrt limitations are deemed to be obvious for the reasons noted above.

Regarding claim 6, Bertero et al. teach AFC layers meeting applicants' claimed limitations (*Paragraph 0026*).

Regarding claims 7 and 8, Bertero et al. teach underlayers and protective layers meeting applicants' claimed structural limits (*Paragraphs 0037 – 0038*).

Regarding claims 9 – 10 and 13 - 15, Bertero et al. teach that the magnetization directions of the various layers are all anti-parallel from each other (*Paragraph 0026*). While Bertero et al. is silent about there being two remanent states meeting applicants' claimed limitations, the Examiner deems that this is necessarily present in an antiferromagnetically coupled recording medium, since that is how the magnetization directions respond in the absence of an applied magnetic field. This is taught in Do et

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al. (page 17 and Figure 7). While Do et al. teach the behavior for hard magnetic materials, the Examiner notes that the magnetization directions and Mrt property is equivalent regardless of whether a material is "hard" (i.e. high coercive force) or "soft" (low coercive force, high saturation magnetization and permeability).

Conclusion


9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Okamoto (U.S. Patent App. No. 2003/0170499 A1) teach an antiferromagnetically coupled recording medium possessing multiple (FM/AFC) bilayers, but does not teach any requirement for the relative Mrt values (*entire disclosure thereof*).

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kevin M Bernatz whose telephone number is (571) 272-1505. The examiner can normally be reached on M-F, 9:00 AM - 6:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carol Chaney can be reached on (571) 272-1284. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

KMB
January 17, 2006


Kevin M. Bernatz, PhD
Primary Examiner